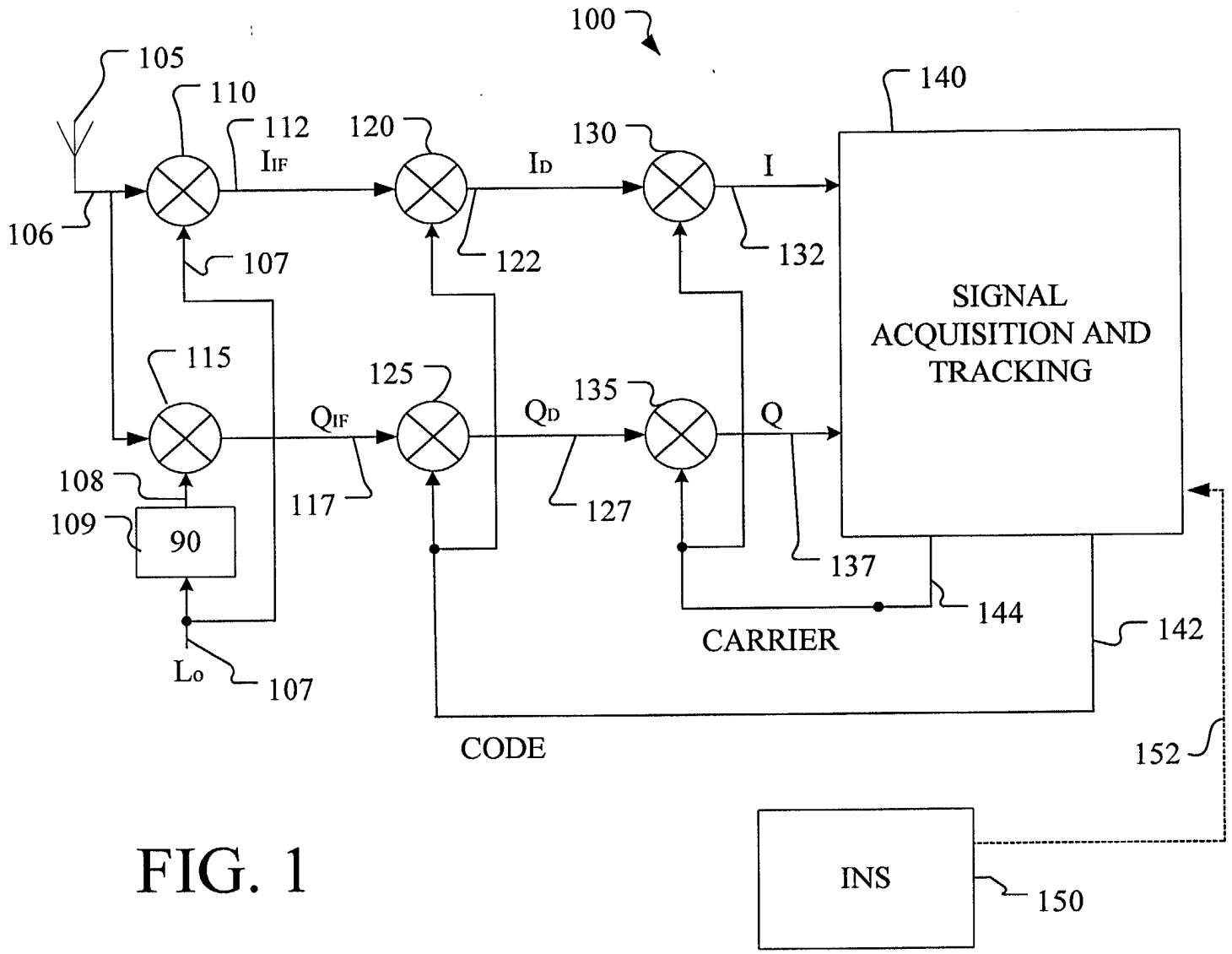

100
105
110
112
120
130
140
I_{IF}
I_D
I
106
107
122
132
SIGNAL
ACQUISITION AND
TRACKING
115
125
135
Q_{IF}
Q_D
Q
108
109
90
117
127
137
144
CARRIER
142
L_O
107
CODE
152
INS
150

FIG. 1

Tozeno 2Thm860

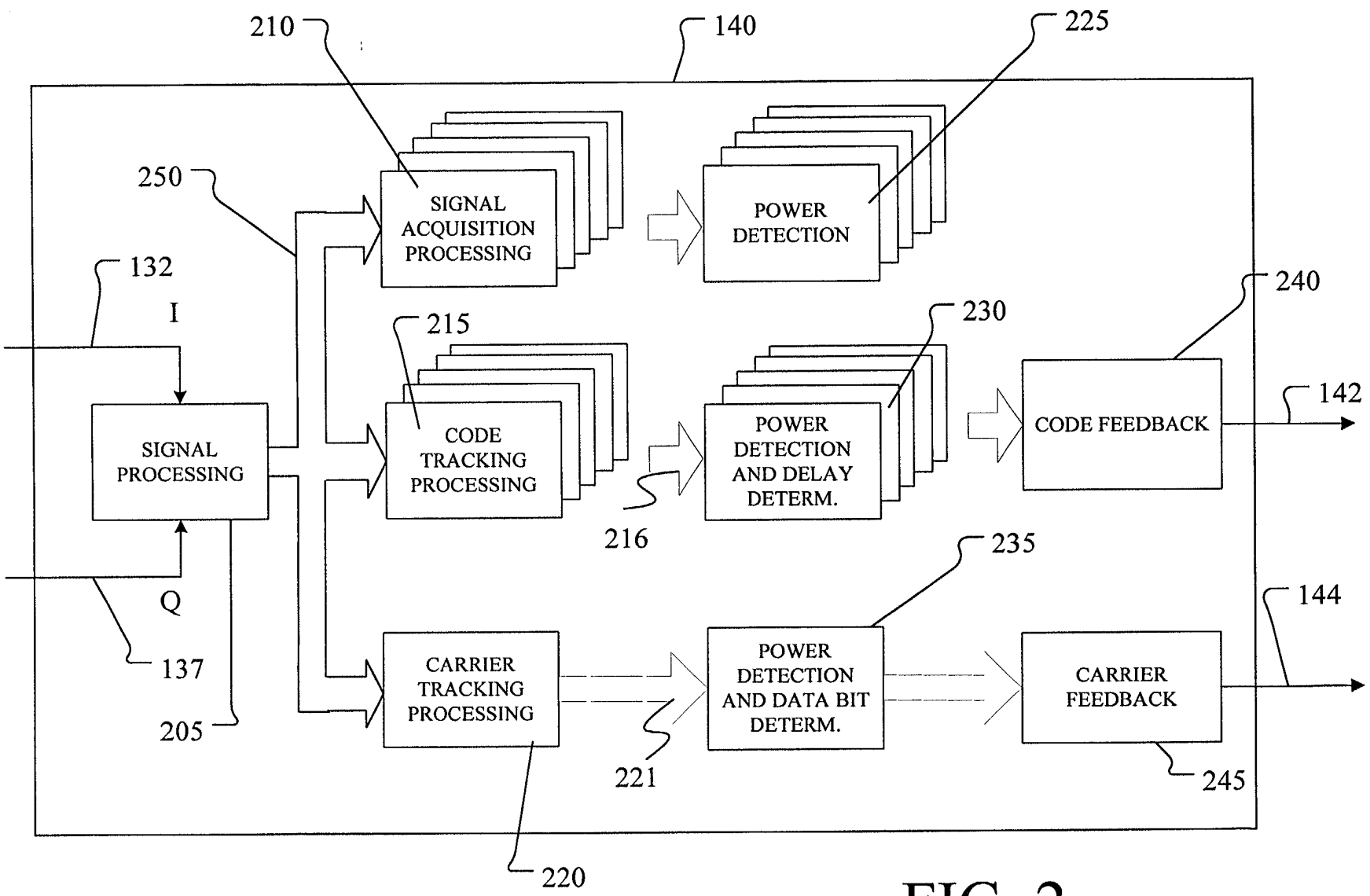
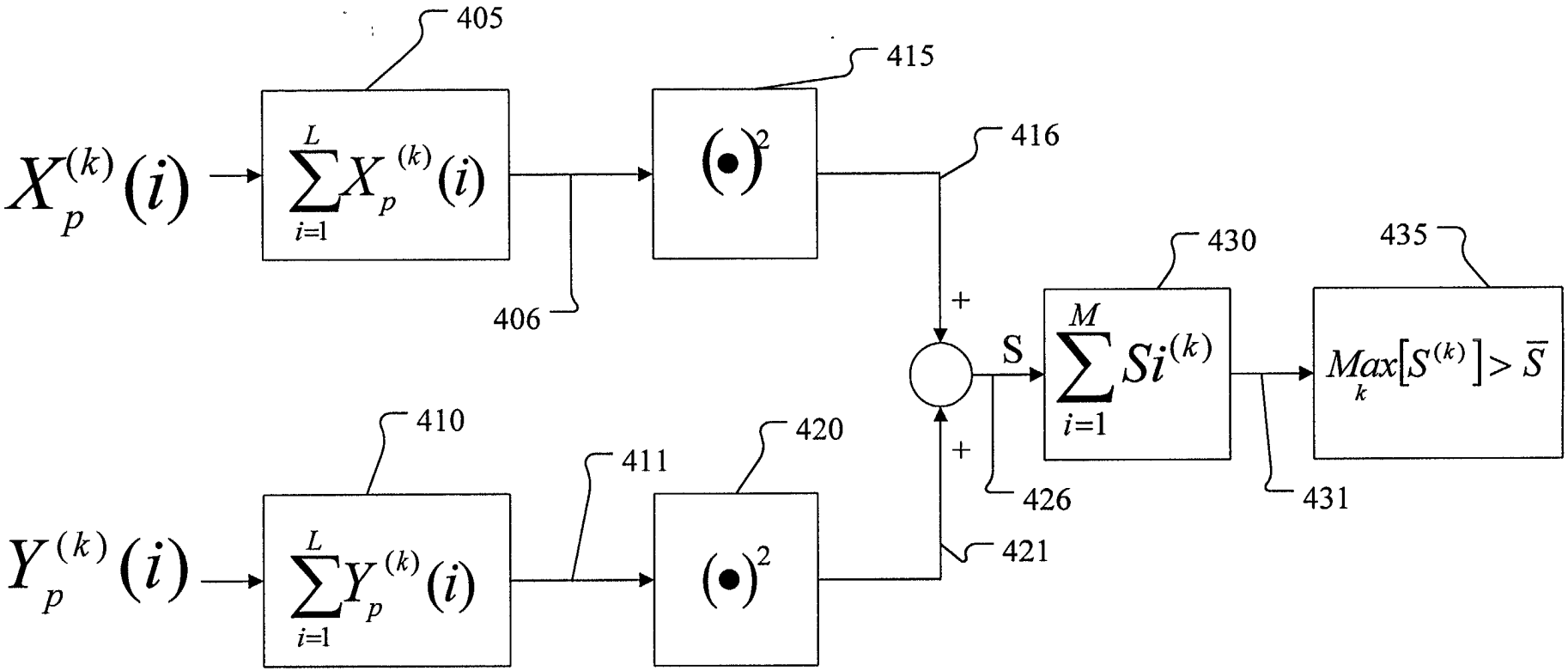


FIG. 2

TABLE 1
CODE TRACKING USING FIVE FREQUENCY BINS AND FIVE PDI SEGMENTS

BIN	f_O Hz	X (I)	Y (Q)
-2	-60	$I_1-Q_2-I_3+Q_4+I_5$	$Q_1+I_2-Q_3-I_4+Q_5$
-1	-30	$I_1+I_2-Q_3-Q_4-I_5$	$Q_1+Q_2+I_3+I_4-Q_5$
0	0	$I_1+I_2+I_3+I_4+I_5$	$Q_1+Q_2+Q_3+Q_4+Q_5$
1	+30	$I_1+I_2+Q_3+Q_4-I_5$	$Q_1+Q_2-I_3-I_4-Q_5$
2	+60	$I_1+Q_2-I_3-Q_4+I_5$	$Q_1-I_2-Q_3+I_4+Q_5$

FIG. 3



K= -2, -1, 0, 1, 2 Frequency Bins
P = "Prompt" code phase

FIG. 4

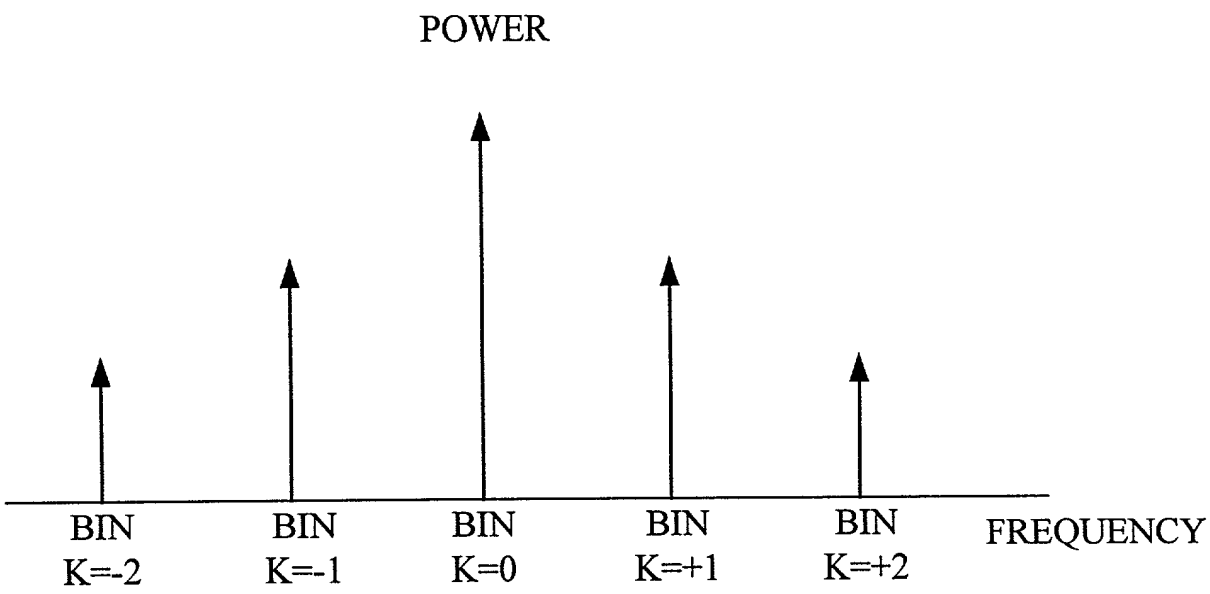

POWER
BIN
K=-2
BIN
K=-1
BIN
K=0
BIN
K=+1
BIN
K=+2
FREQUENCY

FIG. 5

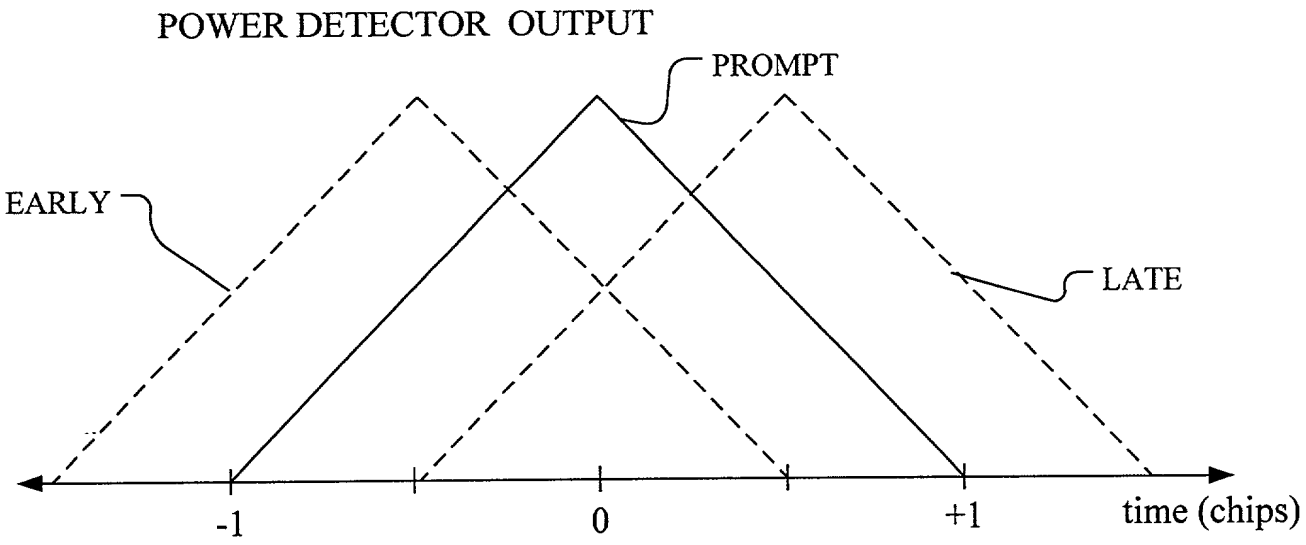

POWER DETECTOR OUTPUT
PROMPT
EARLY
LATE
-1
0
+1
time (chips)

FIG. 7

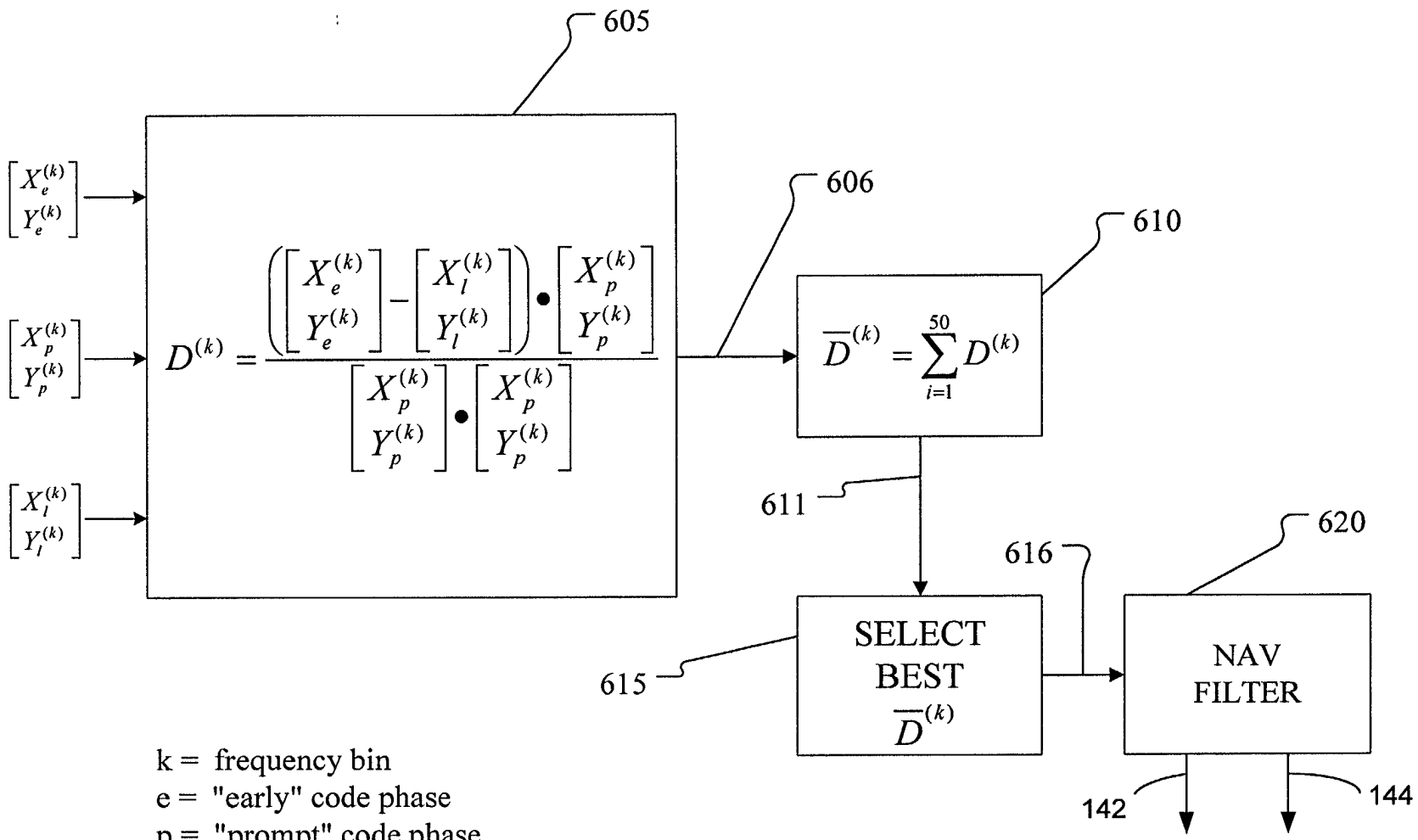

605
606
610
611
620
616
615
$\begin{bmatrix} X_e^{(k)} \\ Y_e^{(k)} \end{bmatrix}$
$\begin{bmatrix} X_p^{(k)} \\ Y_p^{(k)} \end{bmatrix}$
$\begin{bmatrix} X_l^{(k)} \\ Y_l^{(k)} \end{bmatrix}$
$D^{(k)} = \frac{\left(\begin{bmatrix} X_e^{(k)} \\ Y_e^{(k)} \end{bmatrix} - \begin{bmatrix} X_l^{(k)} \\ Y_l^{(k)} \end{bmatrix}\right) \bullet \begin{bmatrix} X_p^{(k)} \\ Y_p^{(k)} \end{bmatrix}}{\begin{bmatrix} X_p^{(k)} \\ Y_p^{(k)} \end{bmatrix} \bullet \begin{bmatrix} X_p^{(k)} \\ Y_p^{(k)} \end{bmatrix}}$
$\overline{D}^{(k)} = \sum_{i=1}^{50} D^{(k)}$
SELECT BEST $\overline{D}^{(k)}$
NAV FILTER
142
144
k = frequency bin
e = "early" code phase
p = "prompt" code phase
l = "late" code phase

FIG. 6

Delta Carrier Phase Computation

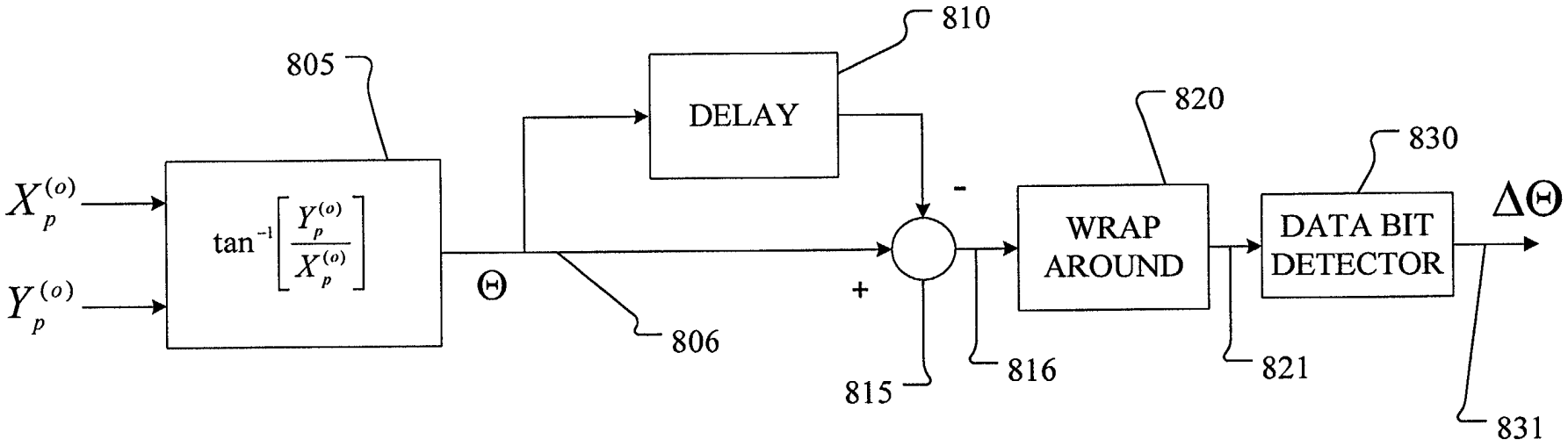


FIG. 8

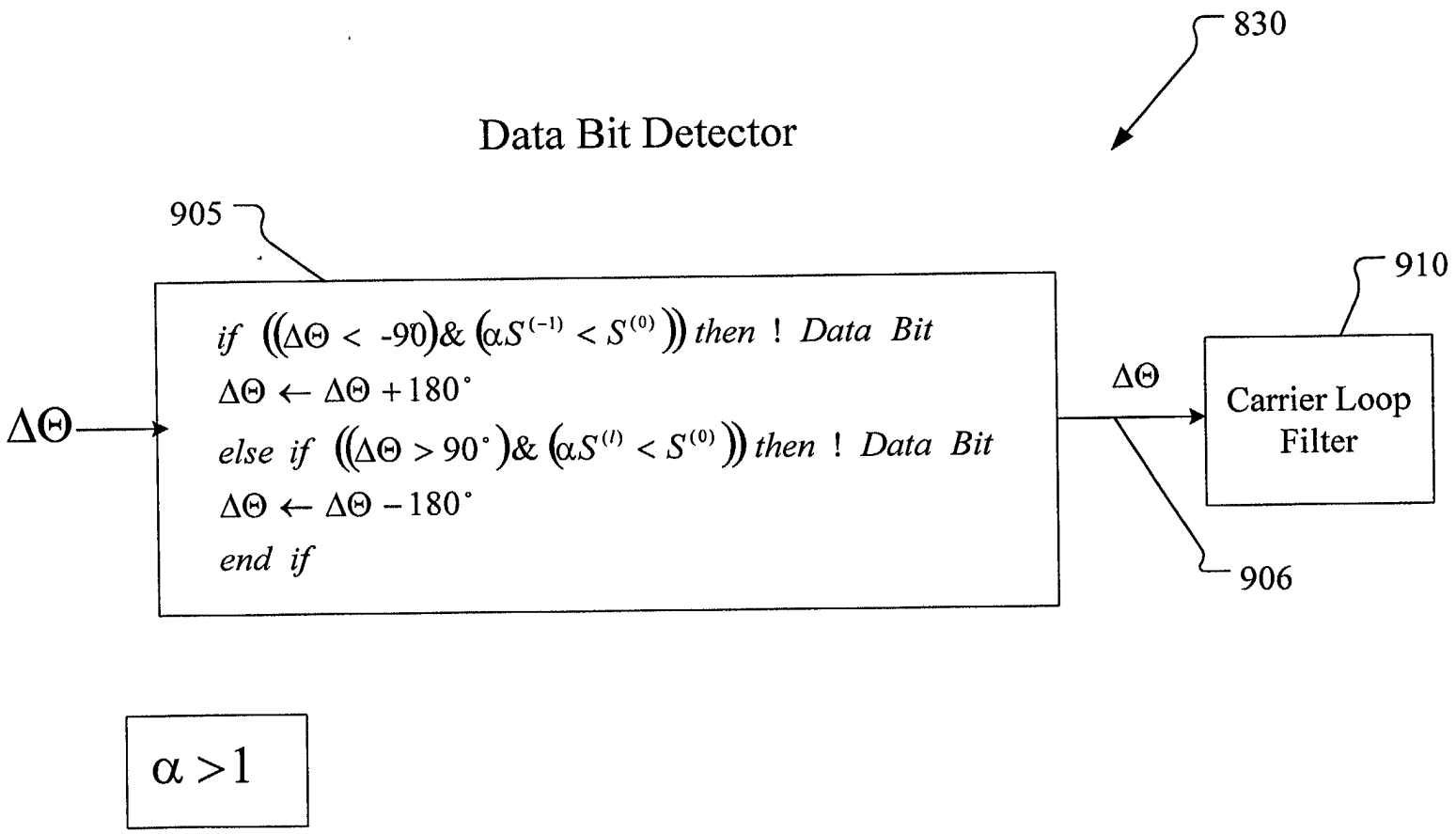

830
Data Bit Detector
905
$\Delta\Theta$
if $((\Delta\Theta < -90) \& (\alpha S^{(-1)} < S^{(0)}))$ then ! Data Bit
$\Delta\Theta \leftarrow \Delta\Theta + 180^\circ$
else if $((\Delta\Theta > 90^\circ) \& (\alpha S^{(1)} < S^{(0)}))$ then ! Data Bit
$\Delta\Theta \leftarrow \Delta\Theta - 180^\circ$
end if
$\Delta\Theta$
910
Carrier Loop Filter
906
$\alpha > 1$

FIG. 9